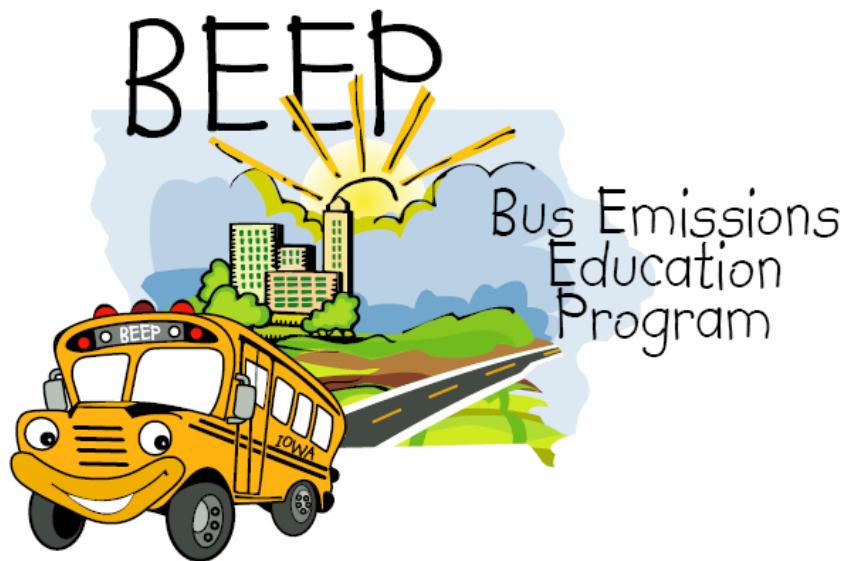


Clean School Bus USA Diesel School Bus Retrofit Project

Bus Emissions Education Program:



Final Report

**Prepared by Wendy Rains, Environmental Specialist Sr.,
Iowa Department of Natural Resources**

September 2007

Executive Summary

The Iowa Bus Emission Education Program (BEEP) is a collaborative effort to reduce childhood exposure to harmful diesel exhaust. The Union of Concerned Scientists ranked Iowa's buses among the dirtiest 20 percent nationally. To improve the state's fleet, BEEP applied for and received funding from the United States Environmental Protection Agency's (EPA) Clean School Bus USA program.

BEEP provided diesel oxidation catalysts (DOCs) for school buses and promoted biodiesel as an alternative fuel to reduce emissions. BEEP provided 213 DOCs to 33 school districts. The school districts provided in-kind support by installing the DOCs. Almost all school districts surveyed recommend the use of DOCs and said their installations are similar to those of standard mufflers. BEEP provided biodiesel to 29 school districts. All but two of the school districts were able to use all of the funds. The two school districts cited availability and storage issues as the reason they were unable to use the funds. All participants of the biodiesel portion of the grant continue to praise biodiesel as a fuel and encourage the expansion of its use.

Project Partners

BEEP partners include the School Administrators of Iowa (SAI), the Iowa Association of School Boards, the Department of Natural Resources (DNR), the Iowa Department of Education, and the Iowa Pupil Transportation Association.

Project Description

The BEEP goal is for Iowa to have the cleanest school bus fleet in the United States. BEEP's objectives are to reduce emissions, maximize school budgets, and save fuel with biodiesel and retrofits. To achieve these objectives, BEEP proposed to provide sustainable low emissions via retrofits and cleaner fuels.

The grant proposed to retrofit approximately 315 school buses with DOCs and to provide biodiesel incentive vouchers to three school districts currently not using the fuel. BEEP sent letters to all school districts in Iowa to promote the grant opportunity. Computer programmers with BEEP partner, DNR, developed a website for school districts to request DOCs, biodiesel, and provide all necessary bus information. The website was convenient for the school districts and provided immediate access to the data in a spreadsheet for BEEP. An email was sent to each district confirming their request. The BEEP administrative view of the website is in Attachment A.

BEEP received requests for only 231 DOCs. Due to the lower demand of DOCs, BEEP amended the proposal to expand the biodiesel portion of the grant. BEEP received 29

applications for biodiesel. Based on the number of active buses, BEEP awarded \$250 per active bus.

BEEP issued an RFP for DOCs on June 16, 2006. After reviewing the four received bids, the RFP was awarded to Auto-jet Muffler Corporation (Auto-jet) on July 27, 2007. The DOC price in the RFP was \$684. The initial requests totaled 231 DOCs. After further review, several buses had existing pollution control equipment or concerns on warranty invalidation. This reduced the final total to 213 DOCs. Each participating school district agreed to pay Auto-jet for each DOC ordered and submitted a verification of installation to BEEP for reimbursement. Due to unforeseen circumstances, 2 DOCs were needed prior to completion of the RFP process. It was BEEP's desire to provide as many DOCs as possible for Iowa school buses, so these DOCs were purchased at \$987 each.

A survey on DOCs was sent to the participating school districts. Twenty-eight school districts responded to the survey, resulting in an 85% response rate. All school districts surveyed recommend the use of DOCs. Most said their installations were similar to those of standard mufflers. The DOC survey results are in Attachment B.

A survey on biodiesel use was sent to the participating school districts. Twenty-seven of twenty-nine schools responded to the survey, resulting in a 93% response rate. All respondents have been satisfied with biodiesel. Most are likely to recommend the use to another school district. Comments on biodiesel usage mentioned limited access to biodiesel and to higher grades of biodiesel. The biodiesel survey results are in Attachment C.

Media & Outreach

Many states and school districts contacted BEEP partners on the program for more information. Journalists and the Union of Concerned Scientists have contacted BEEP for program updates. The BEEP partners have worked diligently to promote cleaner school buses and to encourage other states and school districts to improve their fleets' emissions.

Technology/Fuels

Technology - Diesel oxidation catalyst (DOC): BEEP purchased DOCs through Auto-jet which supplied Donaldson's diesel oxidation catalyst with Series 6400 muffler utilizing Engelhard's CMX, 4 cycle, EPA-verified catalyst technology. Auto-jet is well known to the Iowa school transportation community. Their knowledge allowed for efficient project completion.

Fuels

Biodiesel use within the grant has been completed. Based on informal comments and the BEEP survey, biodiesel has been a success. All twenty-seven school districts indicated that they are likely to continue to use biodiesel. All participants of this portion of the grant continue to praise biodiesel and encourage the expansion of its use. A summary of the survey responses is attached in Appendix C.

Vehicles/Engines Involved

BEEP worked with 213 buses with the DOC in 33 school districts. The buses engines involved were primarily Caterpillar, Cummins, Detroit Diesel, Ford, and I.C. Corporation (International/Navistar).

Miles Driven/Engine Usage/Fuel Consumption

In 2002, the Iowa fleet of 4,496 k-12 diesel school buses represented 79% of the transportation fleet. The 4,496 buses traveled 55,358,476 miles annually, consuming 5,831,092 gallons per year on average. In 2006, the diesel school buses had increased to 4,994 diesel buses which represented 83% of the fleet. These buses traveled 57,216,944 miles annually and consumed 6,332,008 gallons per year on average. These numbers are based on 7.5 miles per gallon.

Emissions Reductions

According to the data from EPA's verification, each DOC reduces particulate matter air emissions by 20%, carbon monoxide emissions by 40%, and hydrocarbon emissions by 50%. Fleet-wide emission testing has not been conducted since the DOCs were installed.

Budget

BEEP received \$248,000 from EPA. BEEP used \$149,952 for the 213 DOCs. BEEP spent \$83,500 on biodiesel. BEEP partner, SAI, charged 5% or \$11,673, to administer and coordinate the grant. School districts donated "in-kind" contributions of \$9,476.26 for DOC installation and \$2,846.08 for biodiesel activities. The BEEP committee provided \$13,374.95 for in-kind donations. Total in-kind donations were \$25,697.29. The remaining \$2,876 of the grant remained unexpended.

Challenges, Lessons Learned and Recommendations

Biodiesel availability: In spite of Iowa's leadership in biodiesel production, accessibility was an issue in parts of the state. Two school districts wanted higher biodiesel grades but were unable to receive them from their fuel provider. A few school districts did not receive access to biodiesel until spring 2007 and were unable to use the full portion of the biodiesel vouchers.

DOC acceptance: Almost all participating school districts recommend the use of DOCs, report that installation is similar to that of a regular muffler, and understand the health and environmental benefits.

On-line information requests: BEEP learned that collecting DOC data in a timely matter was extremely difficult. To reduce the time frame, BEEP utilized the Internet for the application process. Each school district was able to apply for the DOCs and biodiesel portion of the grant and submit all needed information. Confirmations were emailed to speed up the verification process between the request and order timeline.

DOC applicability: School districts were asked to confirm the existence of a DOC on their line or specification sheet. There was confusion about existing control equipment on newer buses and bus warranty information. A recommendation to other applicants is to reconfirm existing control equipment. The school district should also confirm that a DOC installation will not invalidate the existing bus warranty.

Contacts for Further Information

Dr. Dan Smith is the executive director for School Administrators of Iowa (SAI). Cyndi Petersen handled BEEP project coordination at SAI. Both can be reached at (515) 267-1115. Email inquiries may be sent to cpetersen@sai-iowa.org. Max Christianson works in the Iowa Department of Education on transportation issues. He can be reached at (515) 281-4749 or max.christensen@iowa.gov. Terry Voy is the director of school transportation programs for the Iowa School Board Association. Terry may be reached at tvoy@ia-sb.org or at (515) 288-1991. Danny Thede is the transportation director with the Indianola Community School District and represents the Iowa Pupil Transportation Association. Danny may be reached at (515) 961-9592. Mindy Kralicek has replaced Jill Cornell at the Iowa Department of Natural Resources as an Information and Education Specialist. Mindy may be reached at (515) 281-7832 or at mindy.kralicek@dnr.iowa.gov. Wendy Rains also works for the Iowa Department of Natural Resources in the Air Quality Bureau. Wendy may be reached at (515) 281-6061 or at wendy.rains@dnr.iowa.gov.

Attachments:

A: BEEP website for grant application

B: Summary of the DOC survey responses

C: Summary and copies of the biodiesel survey responses



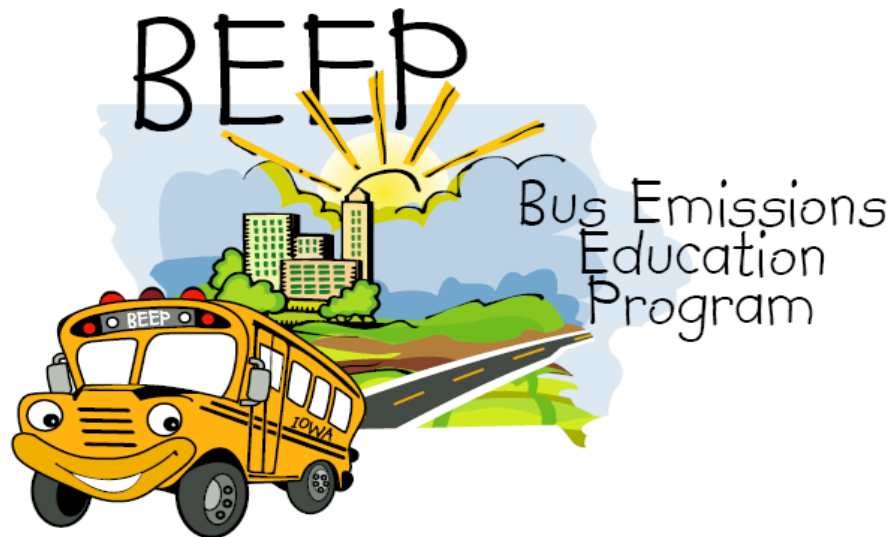
Search our site:

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Bus Emissions Education Program

Partners: School Administrators of Iowa, Iowa Department of Education, Iowa Department of Natural Resources, Iowa Pupil Transportation Association, Iowa Association of School Boards.

**Welcome to the Bus Emissions Education Programs website to apply for diesel oxidation catalyst mufflers and soy diesel fuel vouchers.
Please enter your school district name and access code.**

**School District****Access Code**[Login](#)

**If you are having technical difficulties, please contact Wendy Rains.
Send Questions/Comments to wendy.rains@dnr.state.ia.us or
at 515-281-6061.**



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[Download Survey Data](#)[Download Bus Data](#)

Bus Emissions Education Program

Section A: School District Contact Information

School District	A Select CSD
Name	Admin
Title	Manager
Address	DNR AQ
City	
ZIP Code	
Phone with Area Code	
Email Address	

Section B: Soydiesel Request Sheet

If your district would like to be a part of the grant for free soydiesel, please complete the section below. If your district does not want to participate in the grant, please click [here](#).

[Skip to Section C](#)

Eligibility: All buses are eligible to use soydiesel under the grant. School districts selected under the grant will receive a fuel voucher. BEEP will reimburse the school district upon receipt of verification that the soydiesel has been delivered and paid.

1. Can your fuel provider deliver B10, B20, or higher blends to your district? ☐ Yes ☒ No
2. Do you currently use soydiesel? ☐ Yes ☒ No
If yes, what blends
3. Indicate the total number of diesel buses in your district fleet.
4. How many total gallons of diesel fuel did they use in 2005?
Total miles traveled in 2005?
5. Do you have an on-site storage tank? ☐ Yes ☒ No Tank size
6. Will your fuel provider deliver B10 or B20 pre-mixed to your buses? ☐ Yes ☒ No
7. Does your fuel provider have any delivery restrictions to prevent B10 or B20 use throughout the year?
☐ Yes ☒ No

If yes, please explain _____

8. Identify your fuel vendor

Company _____

Contact Name _____

Phone with Area Code _____

Section C: Bus Information Data for Diesel Oxidation Catalyst Muffler

Diesel Oxidation Catalyst Request:

If your school district would like to receive free diesel catalysts, please complete this section. While the devices are provided at no cost to the school district, to cost-share the grant, school districts are responsible for installation. (Similar to muffler installation, with 1-3 hours of installation required.) If your district does not want to participate in the diesel oxidation portion, please click here. [Skip to Section D](#)

Eligible Buses:

Model year 1991 to present year diesel buses are eligible to receive free oxidation catalysts mufflers provided the bus does not currently have a catalytic muffler. Schools are responsible for installation. **Check the line sheet or with the dealership to ensure the bus does not already have a catalytic muffler installed.**

1. How many diesel buses in your fleet are 1991 to present model year buses? _____

2. Of the above buses in question 1, how many of these buses would you like to retrofit with diesel oxidation catalyst? _____

3. Who will perform the catalyst installation? Check one.

☐ School Maintenance staff ☒ Contracted/outsourced labor

[Click here to quit without saving data](#)

[Click here to Save Data and Continue](#)

Section D: Bus Data for Diesel Oxidation Catalyst Muffler

Please provide bus data for each bus that you wish to receive catalytic mufflers. Bus must be 1991 to present years without catalytic mufflers. Please indicate if the exhaust exits on the driver side or straight rear in the chassis body column.

[Add a Bus](#)

Thank you for completing the BEEP request forms!

Sincerely,

The BEEP Partners

School Administrators of Iowa

Iowa Department of Education

Iowa Department of Natural Resources

Iowa Pupil Transportation Association

Iowa Association of School Boards

[Finish Survey](#)

ATTACHMENT B: DOC SURVEY RESULTS (August 30, 2007)

How would you compare DOC installation to a regular muffler?

<i>Easier</i>	<i>About the same</i>	<i>More difficult</i>	<i>Not Applicable</i>
0	26	2	0

How would you rate your satisfaction with the supplier & shipping of the DOCs?

<i>Very Satisfied</i>	<i>Satisfied</i>	<i>Dissatisfied</i>	<i>N/A</i>
3	22	2	1

Where there any barriers to adopting DOCs?

No. The only comment was that too many groups were involved in the process.

How likely are you to recommend other school districts to adopt and install DOCs?

<i>Strongly endorse</i>	<i>Mostly endorse</i>	<i>Endorse</i>	<i>Mostly oppose</i>	<i>Strongly oppose</i>
11	5	12	0	0

How would you rate your level of satisfaction with BEEP on the grant process?

<i>Extremely satisfied</i>	<i>Mostly satisfied</i>	<i>Satisfied</i>	<i>Mostly dissatisfied</i>	<i>Extremely dissatisfied</i>
15	6	7	0	0

How would you rate your level of satisfaction with BEEP on the reimbursement process?

<i>Extremely satisfied</i>	<i>Mostly satisfied</i>	<i>Satisfied</i>	<i>Mostly dissatisfied</i>	<i>Extremely dissatisfied</i>	<i>N/A</i>
17	4	6	0	0	1

Comments

- No time at all to install
- Reimbursement process is too slow.
- Supplier/shippers were very good.
- Extremely satisfied with supplier/shipper.

ATTACHMENT C: BIODIESEL SURVEY RESULTS (August 30, 2007)

How long have you been using biodiesel?

Less than one year	1-3 years	3-5 years	5-10 years
9	15	3	0

How would you rate your satisfaction with biodiesel?

Extremely satisfied	Mostly satisfied	Satisfied	Mostly dissatisfied	Extremely dissatisfied	N/A
9	14	4	0	0	0

What months did you use biodiesel?

January	February	March	April	May	June	July	August	September	October	November	December
7	8	14	19	19	17	18	19	22	21	13	7

How likely are you to repurchase biodiesel for your school district?

Extremely Likely	Very Likely	Good	Fair	Poor	N/A
11	15	0	1	0	0

How likely are you to recommend biodiesel to another school district?

Extremely Likely	Very Likely	Good	Fair	Unlikely	N/A
10	11	4	1	0	1

Satisfaction with BEEP on Biodiesel

Extremely satisfied	Mostly satisfied	Satisfied	Mostly dissatisfied	Extremely dissatisfied	N/A
16	10	0	0	0	1